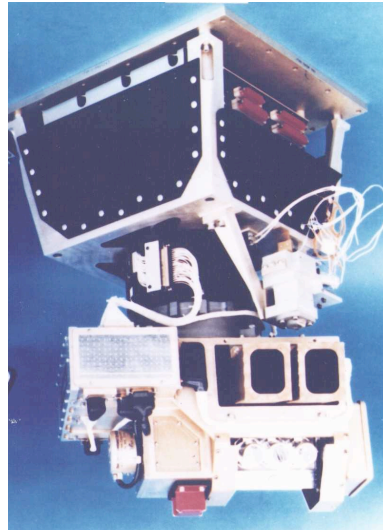
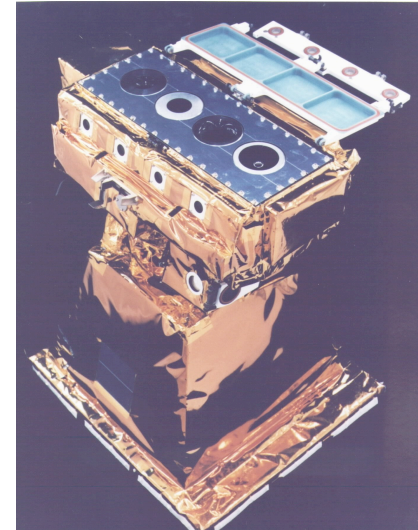


Nimbus 6 & 7
ERBE



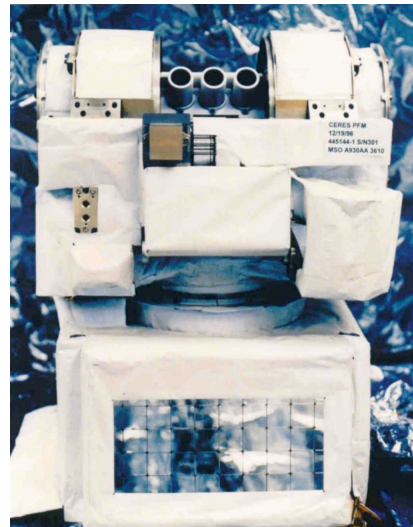
ERBE Scanner



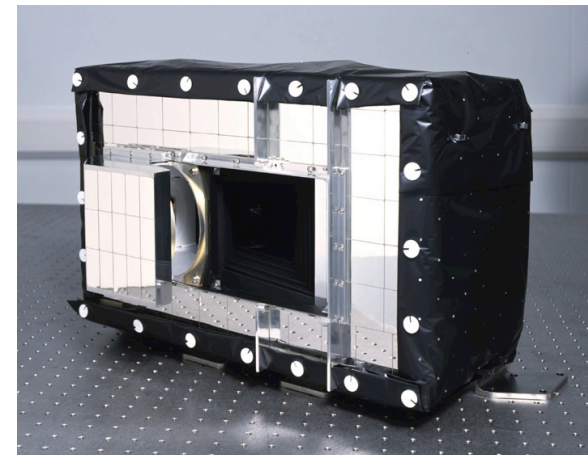
ERBE Non-Scanner



Scarab



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GERB



Part 1: Synopsis of Comparison of Radiation Budget Measurements...

Part 2: NOAA 9 ERBE WFOV Data Set



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Comparison of measurements from satellite-borne radiation budget instruments for 1985-2004

G. Louis Smith¹, Robert B. Lee, III²,
Z. Peter Szewczyk³ and David A. Rutan⁴

1 National Institute of Aerospace

2 NASA Langley Research Center

3 Science Applications International Corp.

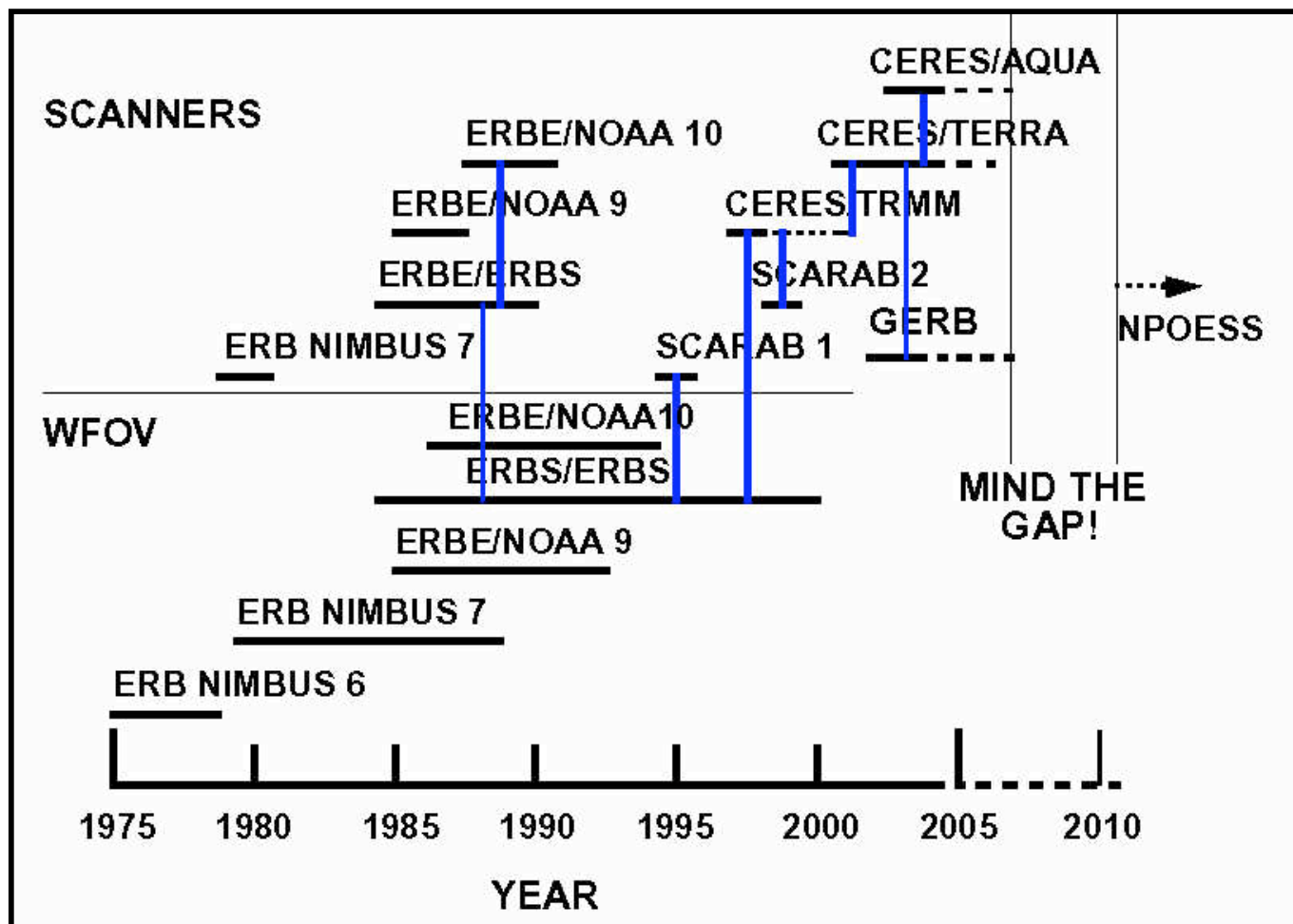
4 Analytical Services and Materials, Inc.



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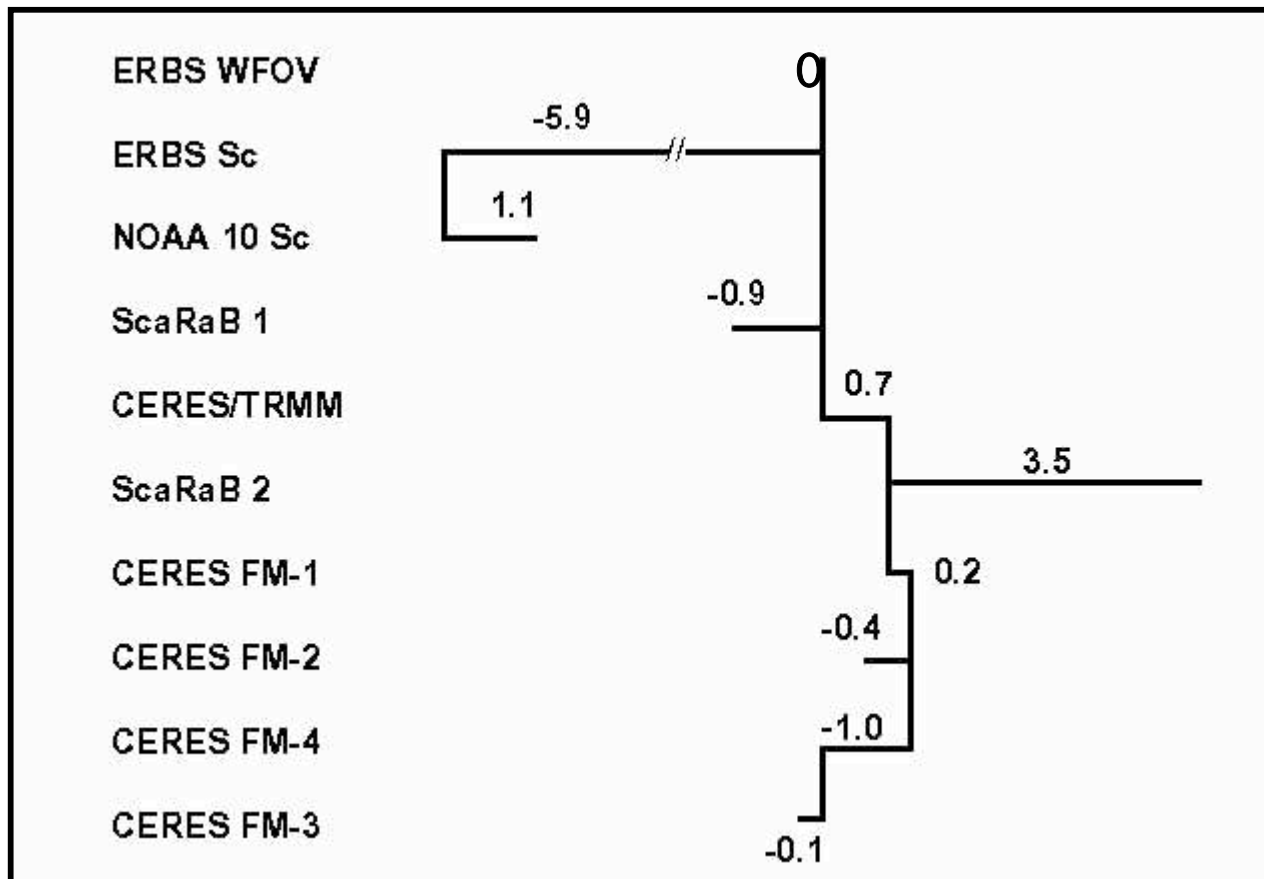
Time Line of Radiation Data Sets



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Traceability for Shortwave



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Comparison Summary

Shortwave

	ERBS Sc	ERBS NS	NOAA 10 Sc	ScaRaB 1	CERES/ TRMM	ScaRaB 2	CERES FM-1	CERES FM-2	CERES FM-3	CERES FM-4
ERBS Sc	-	-5.9	-1.1	-5.0	-6.6	-10.1	-6.8	-6.4	-5.7	5.8
ERBS NS	4.5	-	-4.8	0.9	-0.7	4.2	0.9	-0.5	0.2	0.1
NOAA 10 Sc	11.7		-	-3.8	-5.4	-8.9	-5.6	-4.2	-4.5	-3.7
ScaRaB 1	7.9	6.5		-	-1.6	-5.1	-1.1	1.4	-0.7	-0.8
CERES/TRMM	13.5	12.7	17.9	14.3	-	-3.5	-0.2	0.2	0.9	0.8
ScaRaB 2	15.1	14.4	19.2	15.8	6.9	-	3.3	4.7	4.4	4.3
CERES FM-1	16.4	15.8	20.2	17.1	9.4	11.7	-	0.4	1.1	1.0
CERES FM-2	16.4	15.8	20.2	17.1	9.4	11.7	0.6	-	0.7	0.6
CERES FM-3	16.6	16.0	20.3	17.2	9.6	11.9	2.2	2.3	-	-0.1
CERES FM-4	16.6	16.0	20.3	17.2	9.6	11.9	2.2	2.3	0.2	-



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Part 2: NOAA 9 WFOV Data SET

Kathryn A. Bush, G. Louis Smith and
Tak-Meng Wong



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NOAA 9 WFOV Data Set

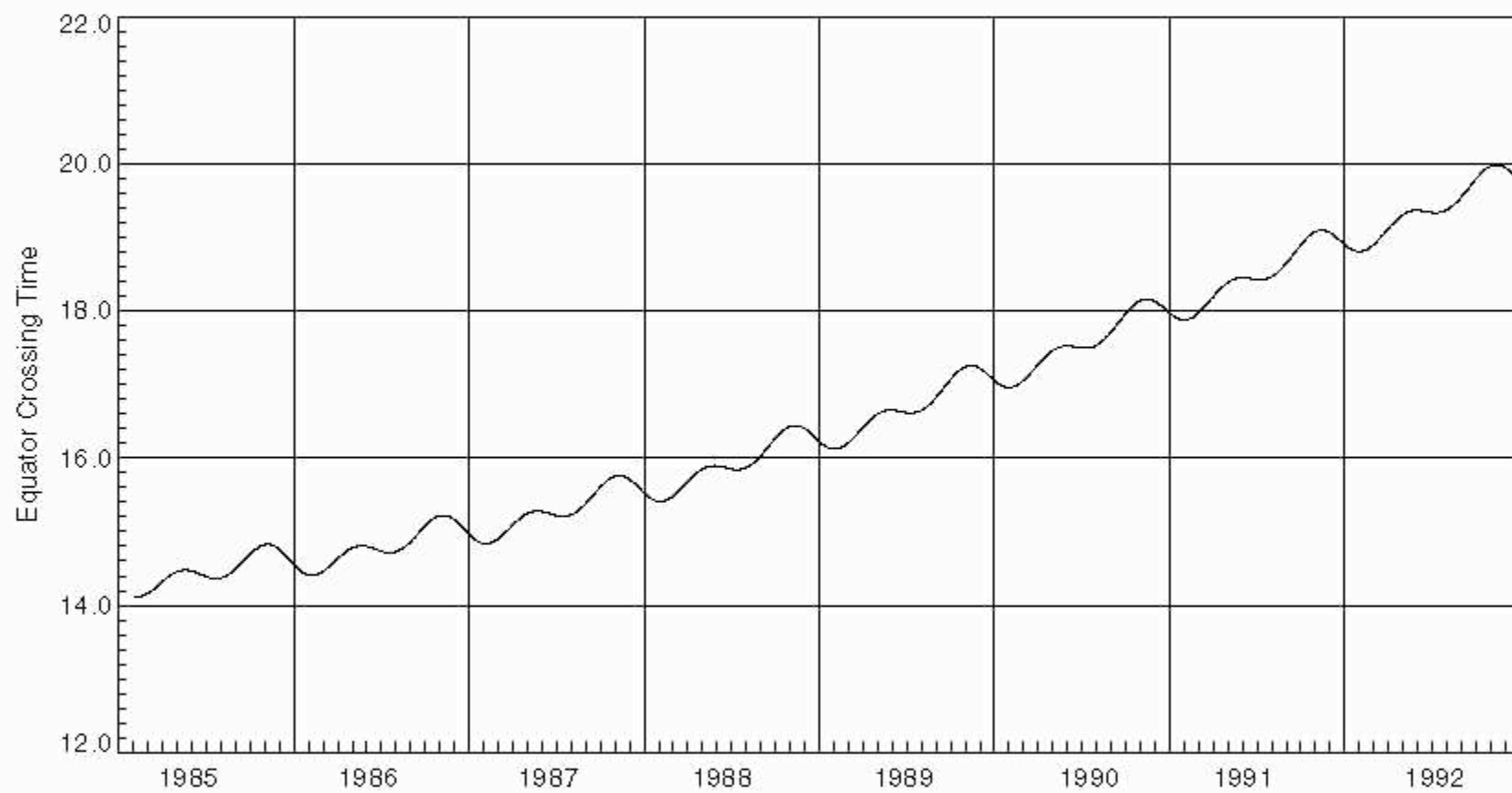
- Data cover period 1985 – 1992.
- Global coverage.
- Completion and validation of reprocessed data set delayed by improvements to ERBS 15-year data set.
- Study underway of new NOAA 9 data set.
- Major problem of NOAA 9 is precession of orbit to Equator crossing near terminator.



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NOAA-9 Equator Crossing Time 8502 - 9212



NOAA-9 Orbit and Data

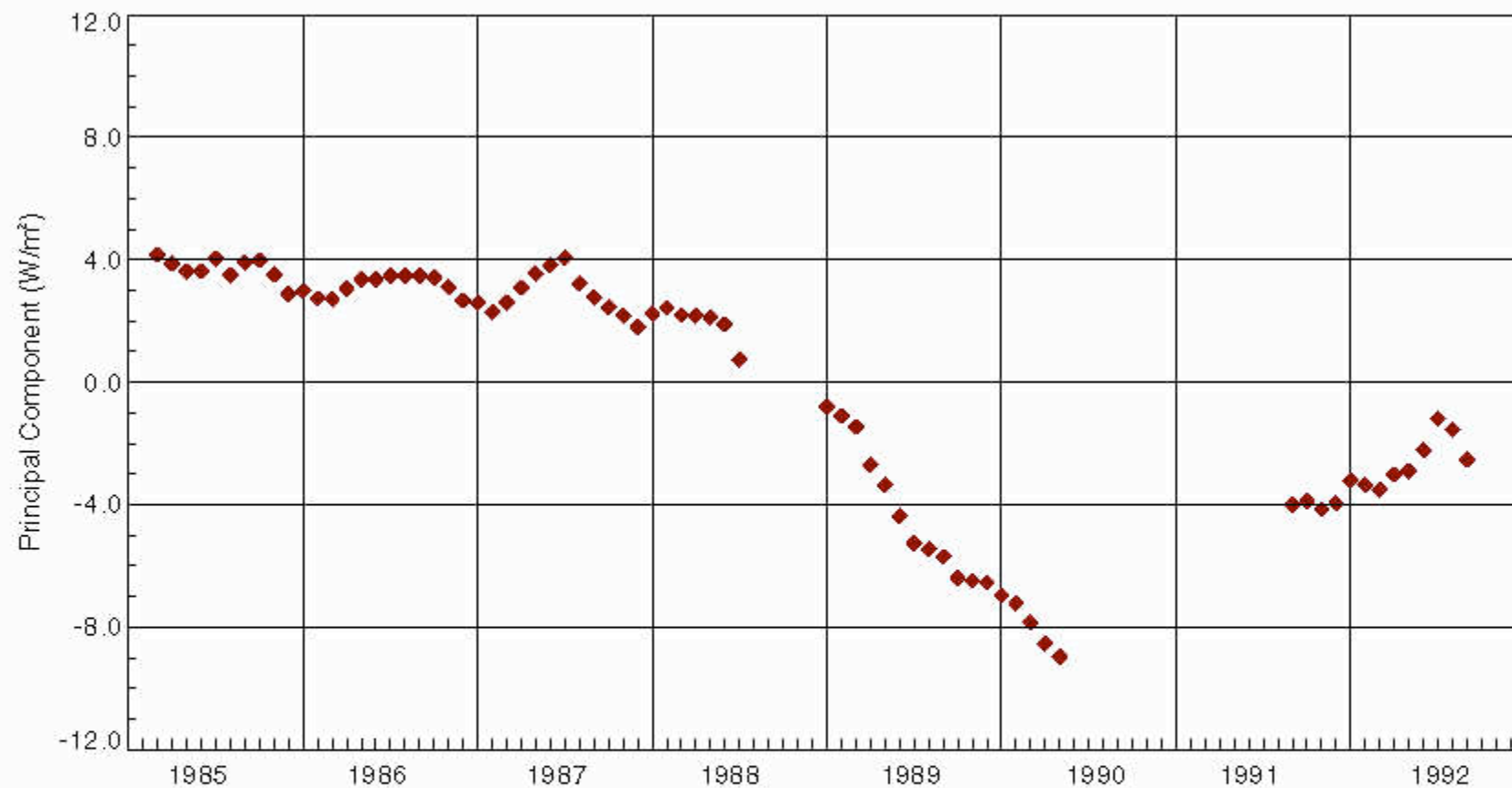
- Due to precession, there are problems with SW for 1988-1992 for 60°S to 60°N.
- ERBS provides coverage for 60°S to 60°N.
- NOAA-9 provides excellent near-noon data for far north and near-midnight for far south.



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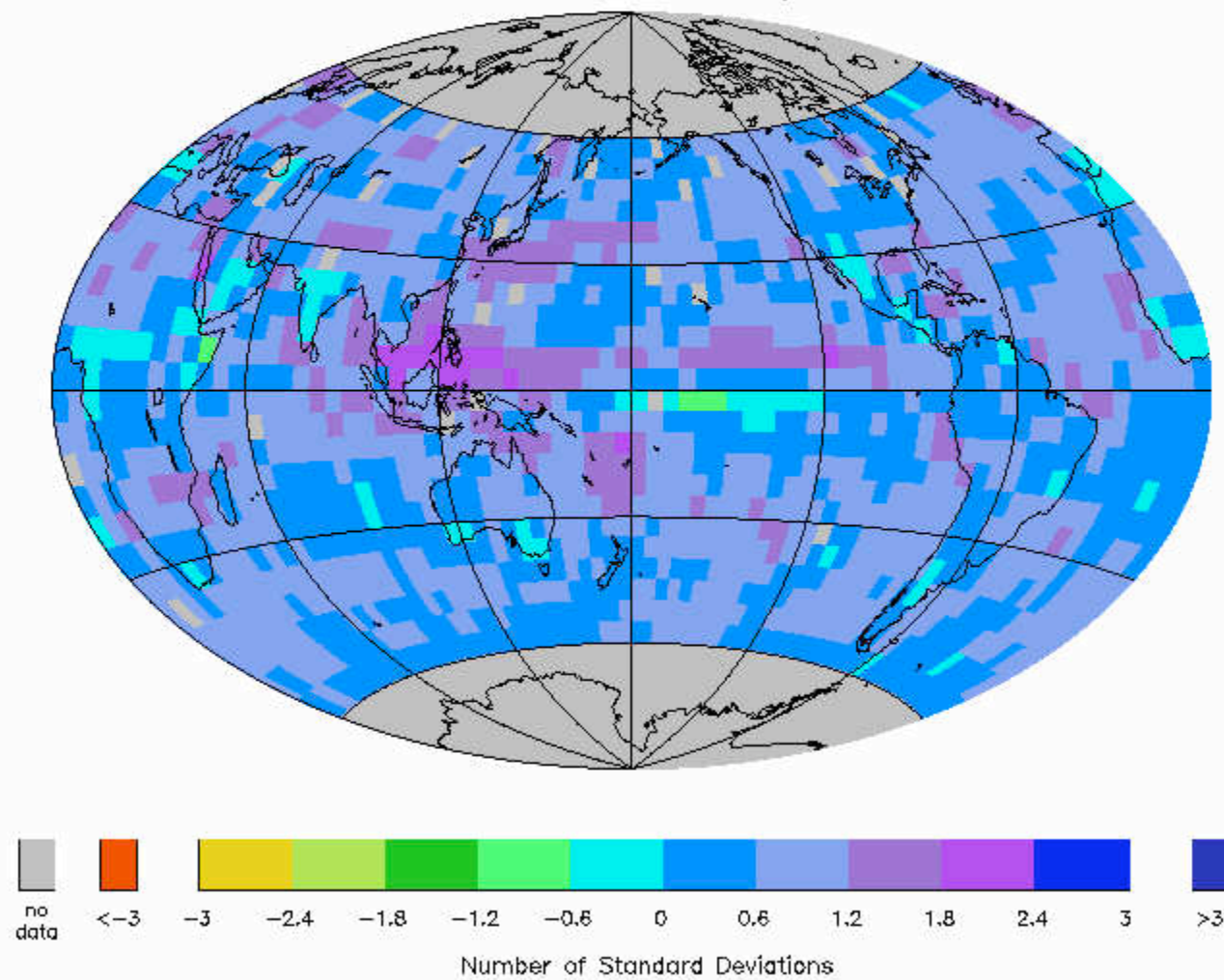
8502 - 9212 60N - 60S Latitude



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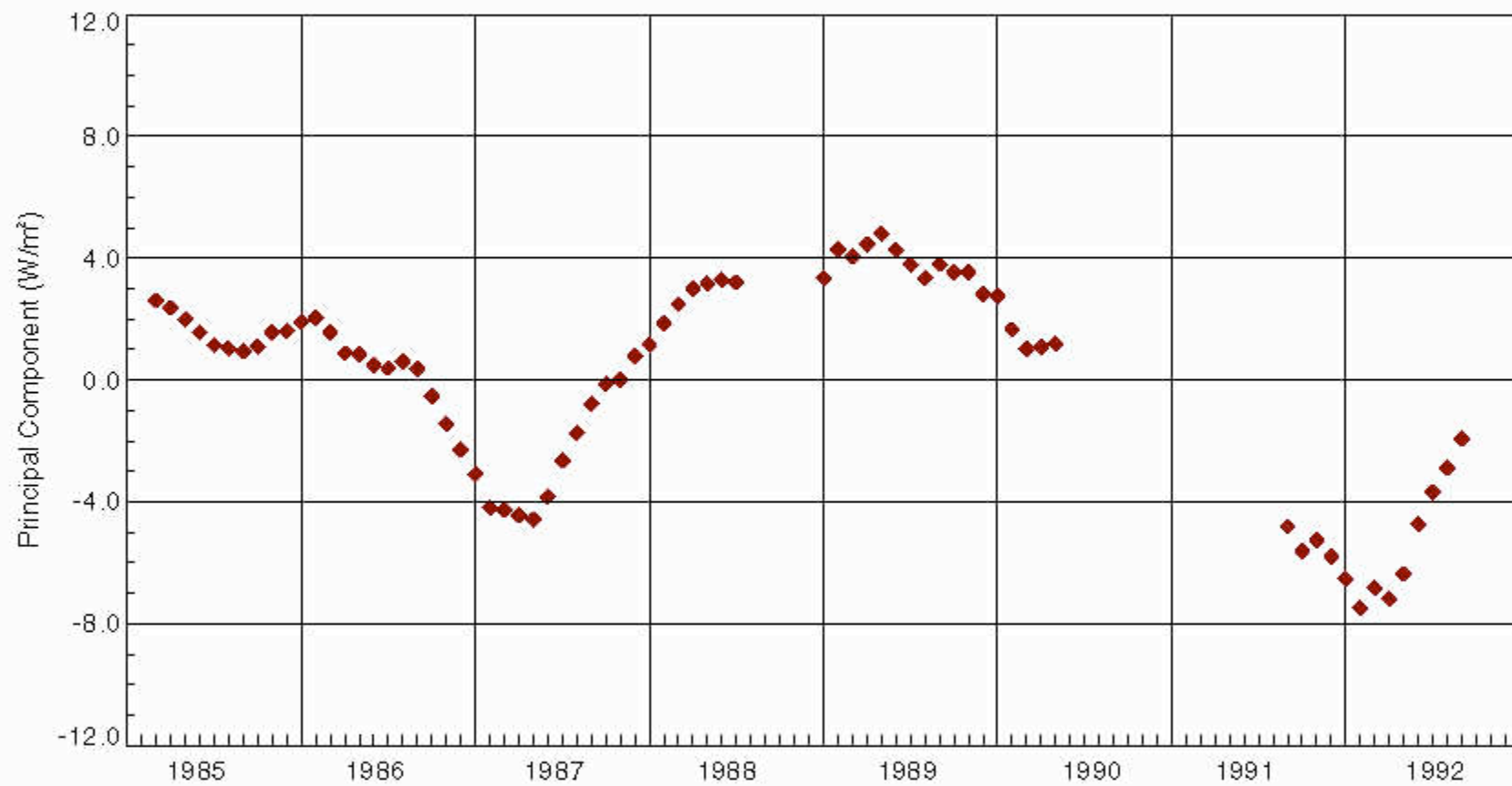


NOAA 9 SWR Flux Anomaly First EOF

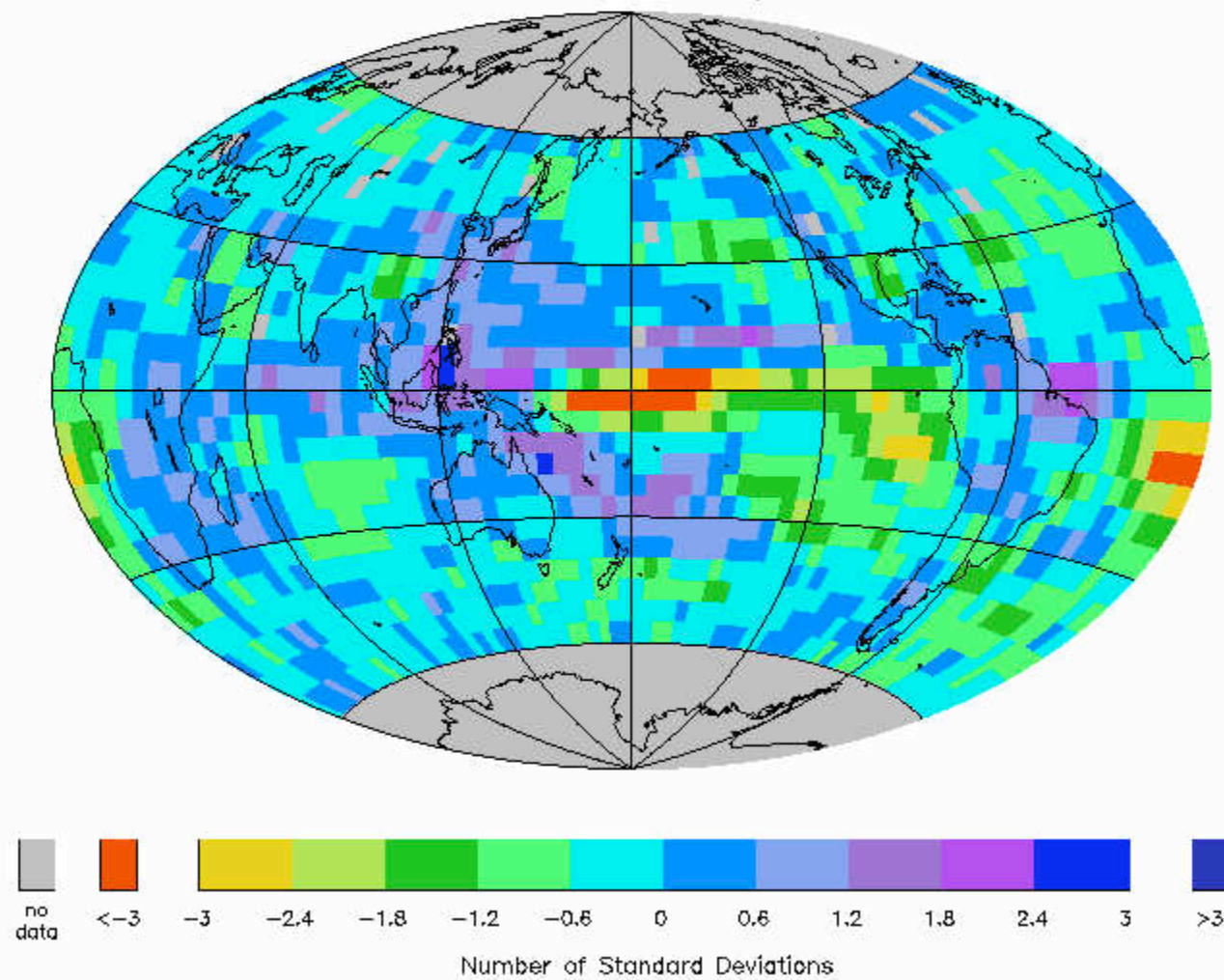


Second Principal Components of NOAA-9 SWR Anomaly

8502 - 9212 60N - 60S Latitude

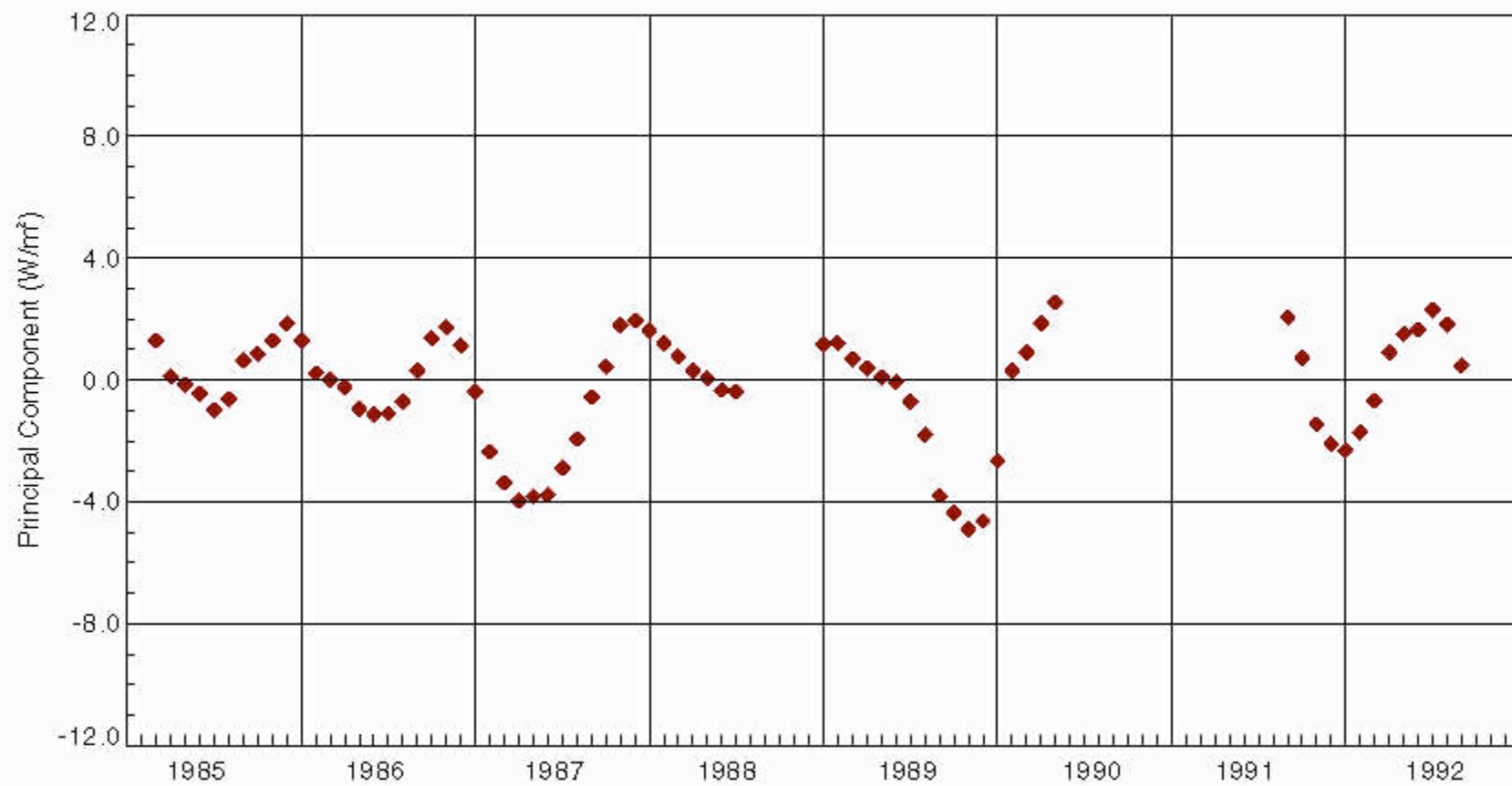


NOAA 9 SWR Flux Anomaly Second EOF

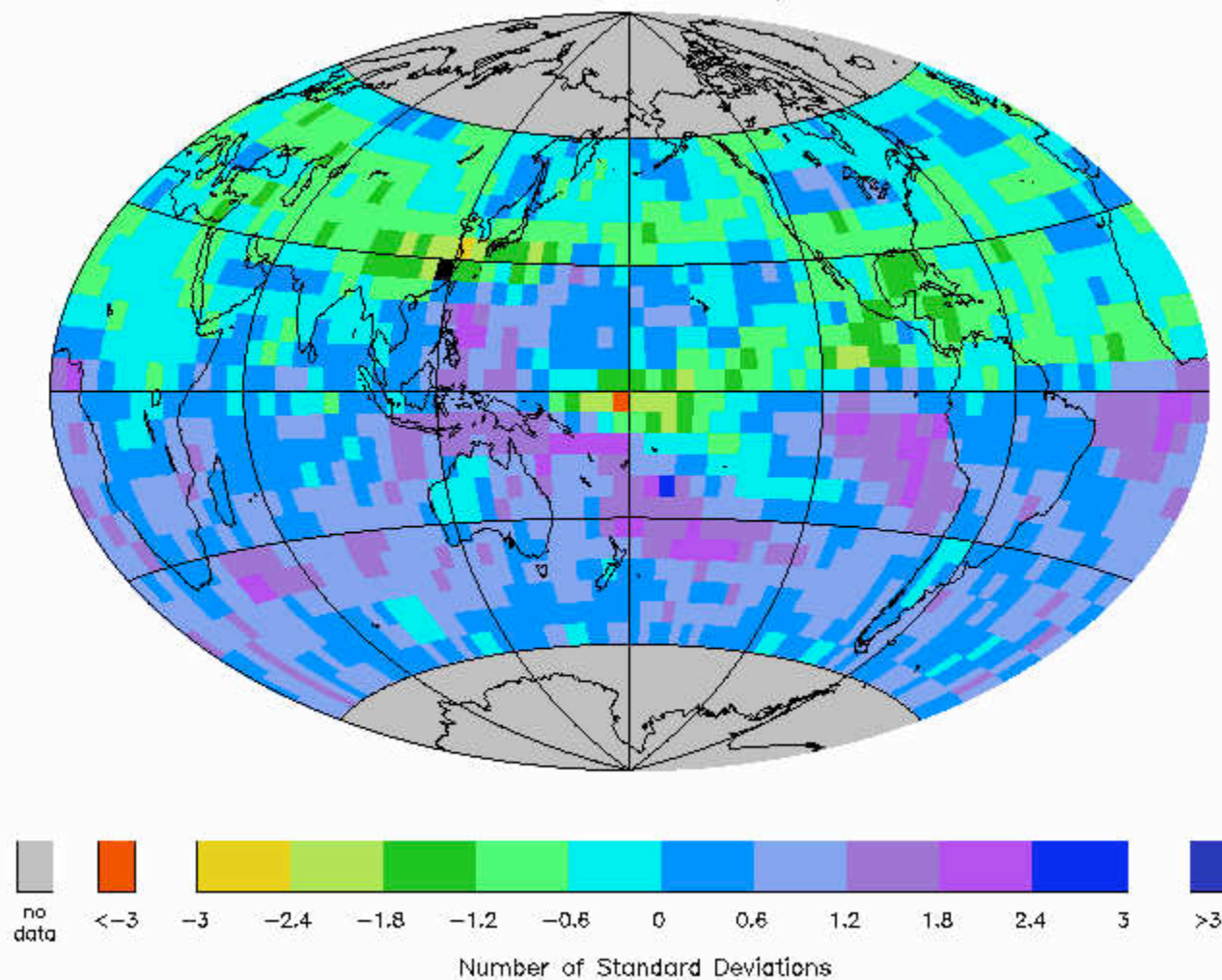


Third Principal Components of NOAA-9 SWR Anomaly

8502 - 9212 60N - 60S Latitude



NOAA 9 SWR Flux Anomaly Third EOF



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Results from SW Study

- SW PC-1 is an artifact of a nearly uniform darkening (up to 12 W-m^{-2}) of the Earth as the S/C precesses to a sun-set Equator crossing.
- SW PC-2 shows ENSOs of '87 & '92.
- SW PC-3 is a combination of an artifact of precession and ENSOs.
- Identification and quantification of artifacts provides a method of elimination.

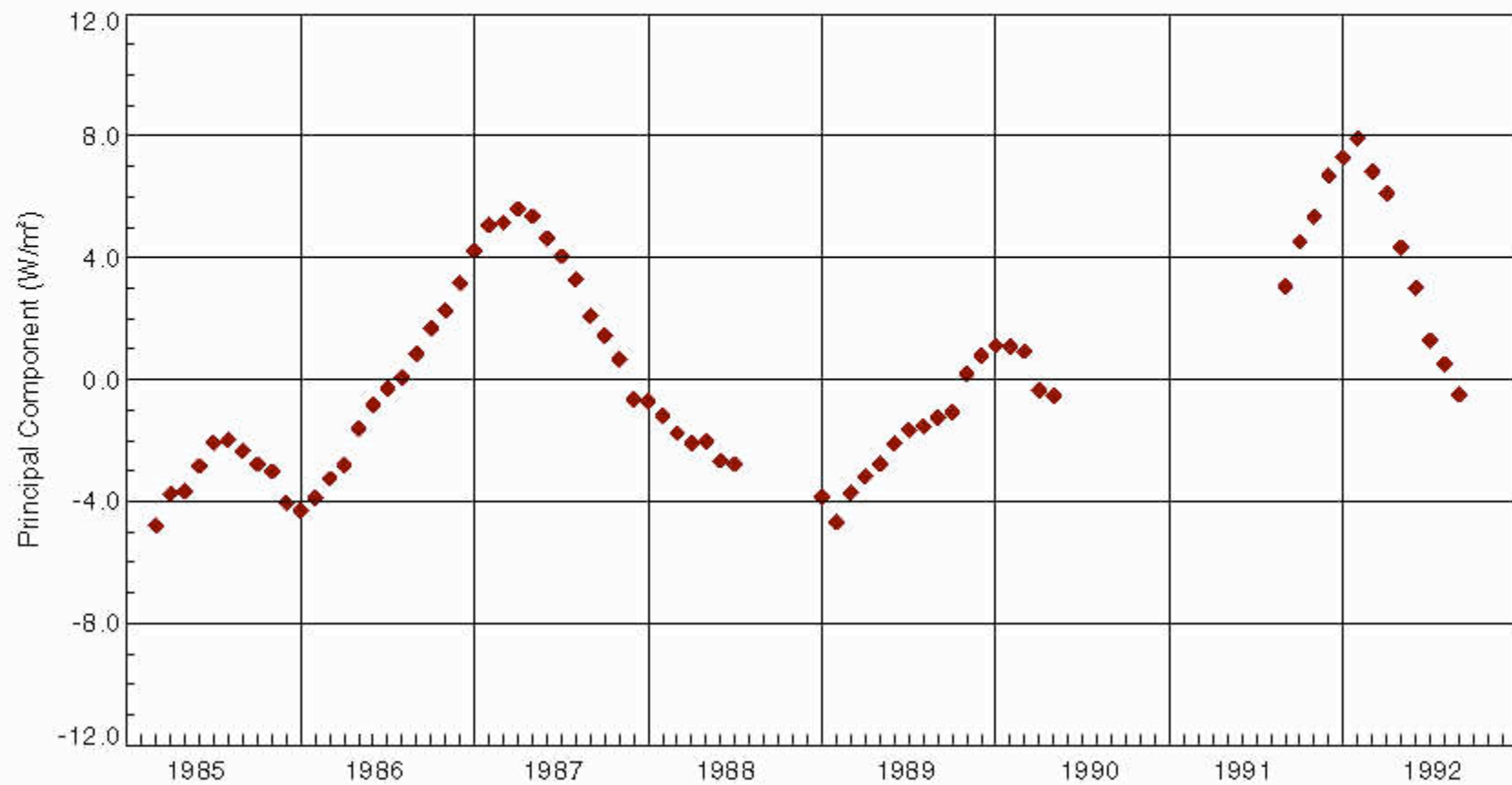


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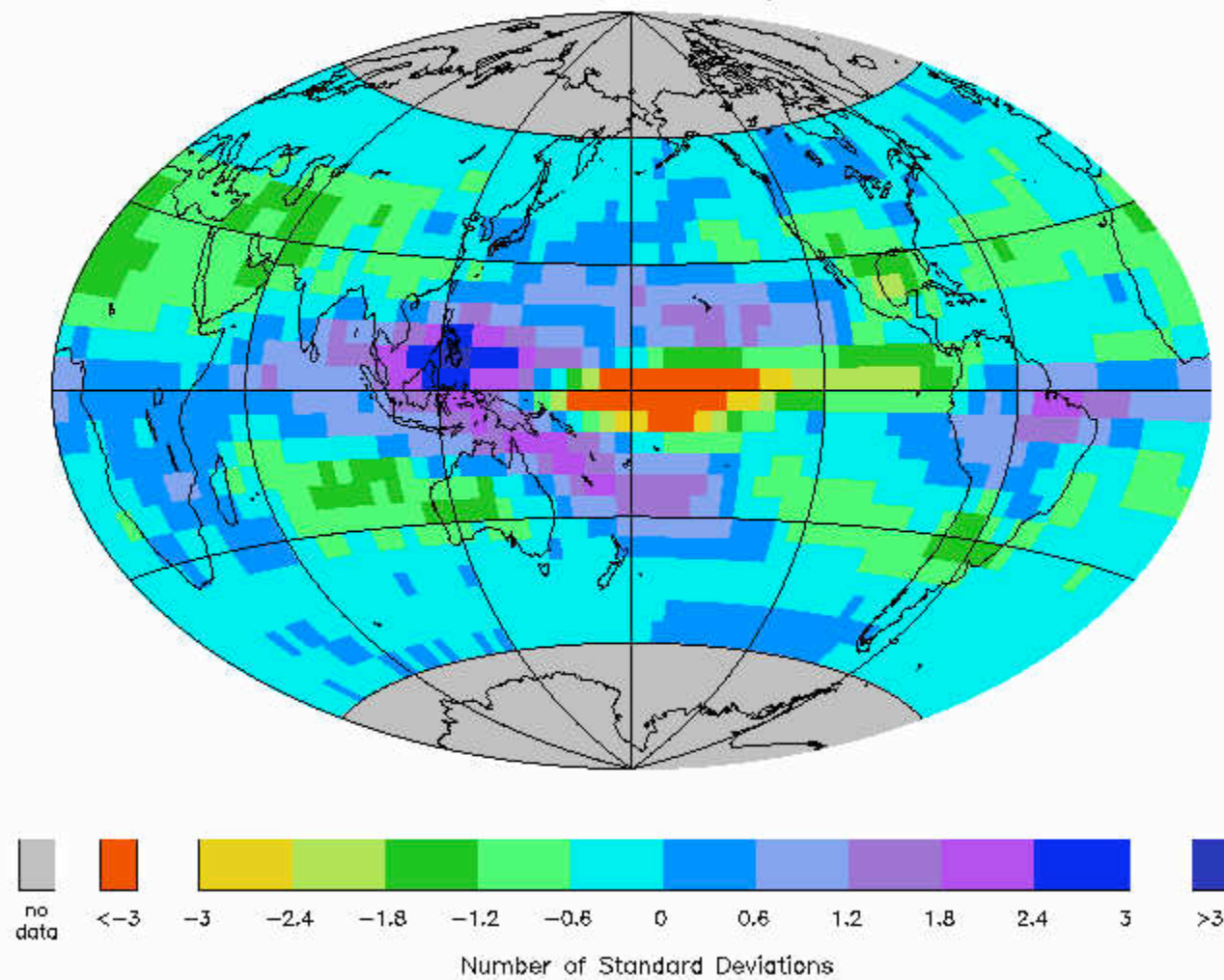


First Principal Components of NOAA-9 OLR Anomaly

8502 - 9212 60N - 60S Latitude

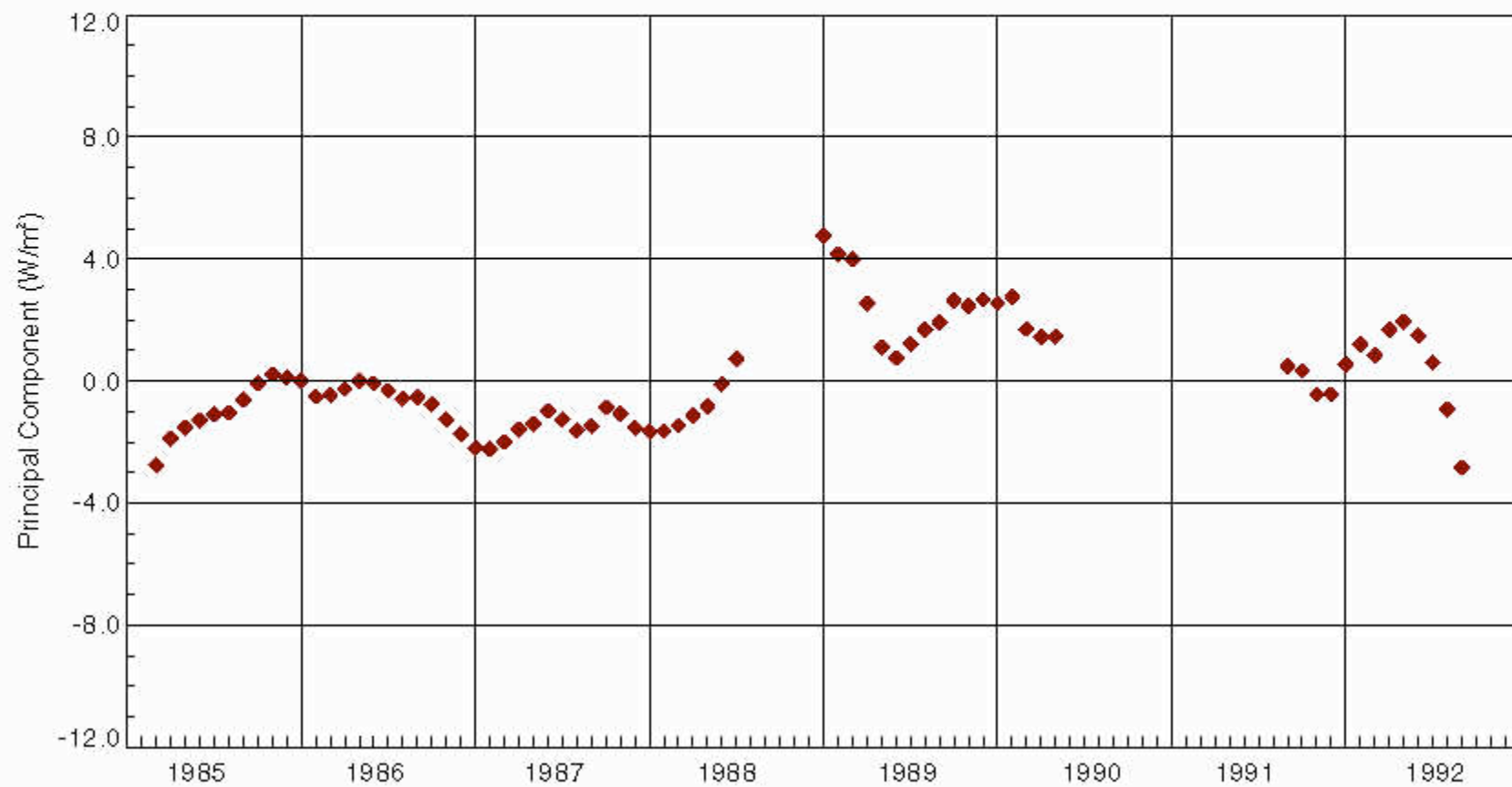


NOAA 9 LW Flux Anomaly First EOF



Second Principal Components of NOAA-9 OLR Anomaly

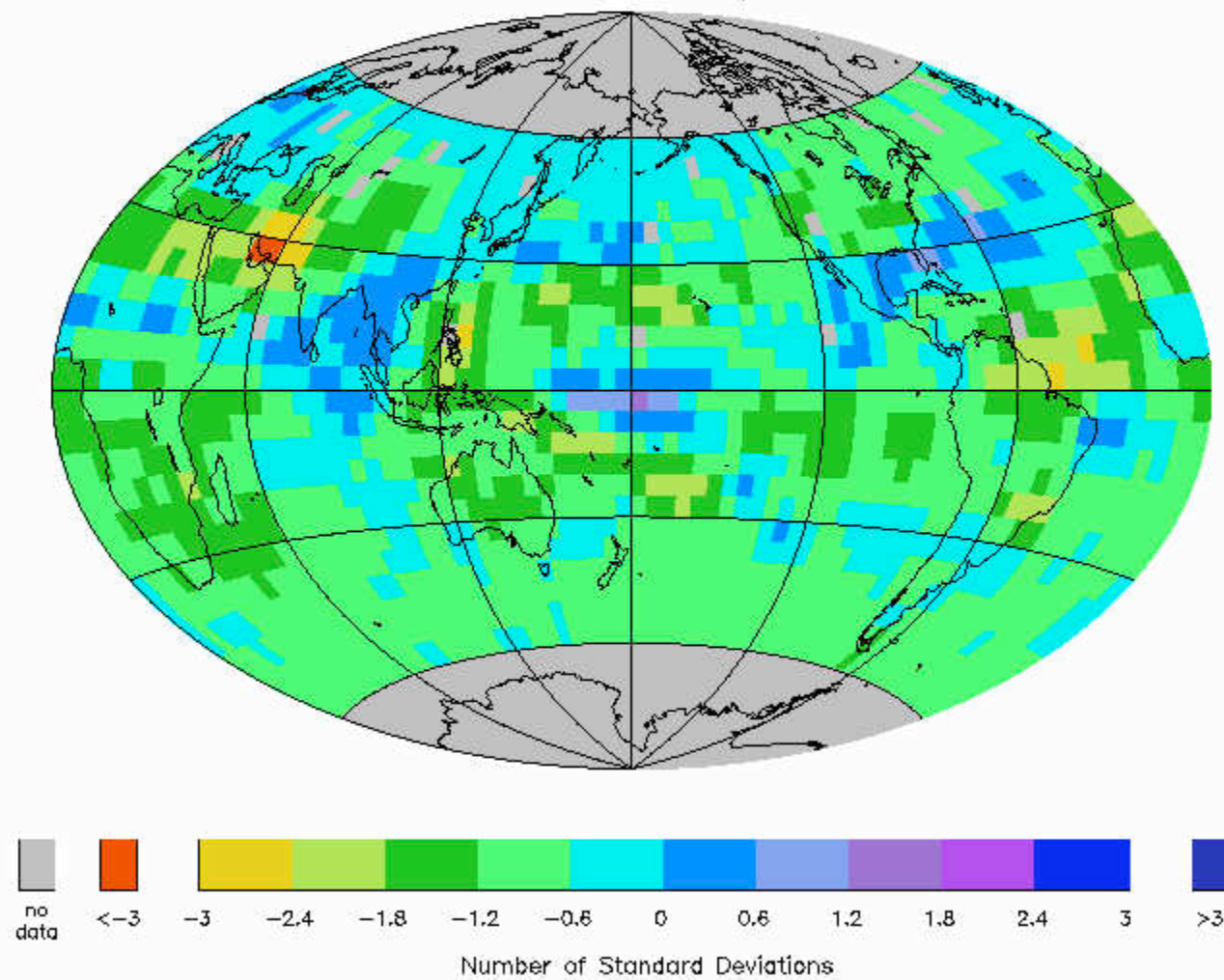
8502 - 9212 60N - 60S Latitude



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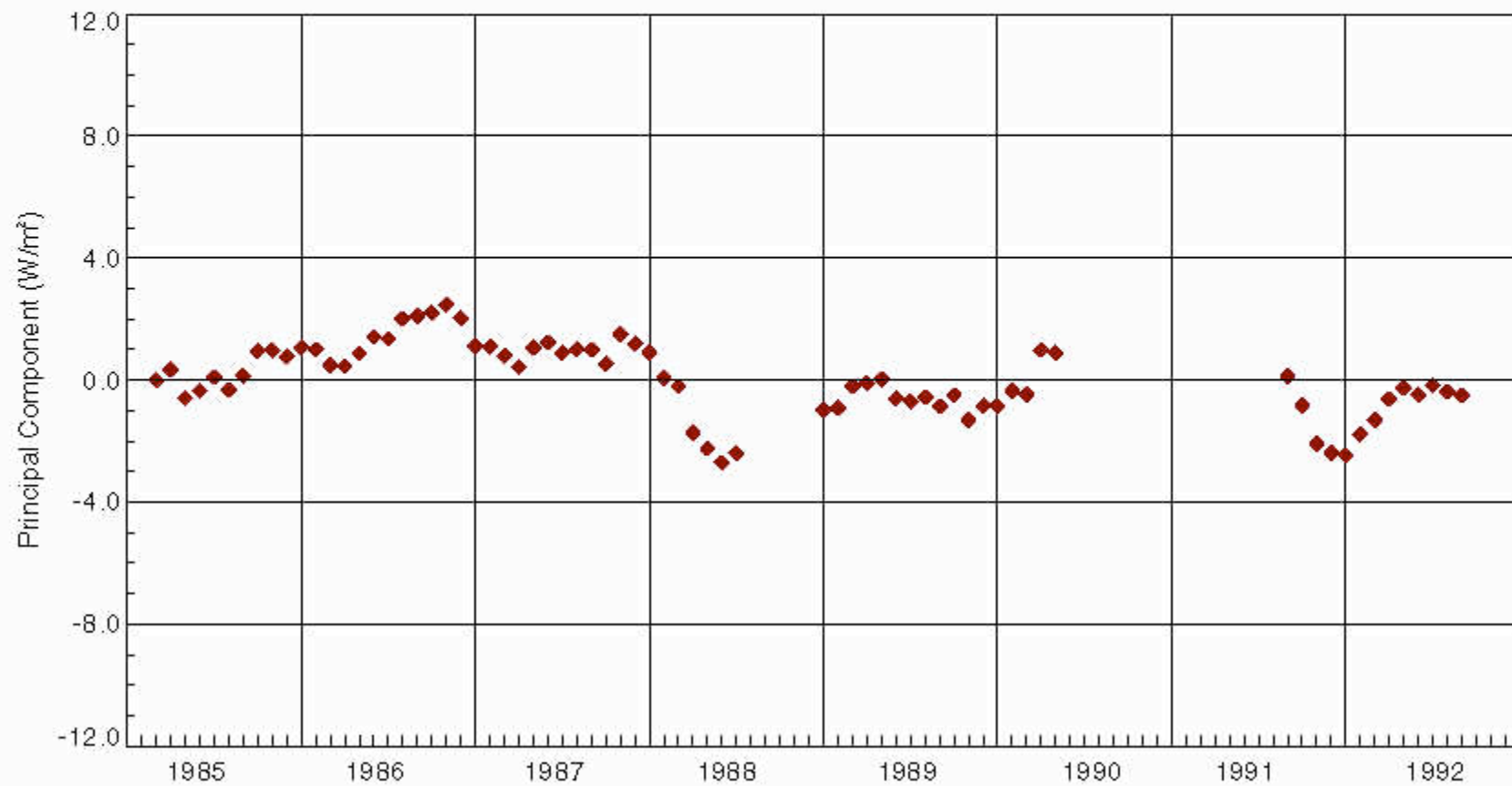


NOAA 9 LW Flux Anomaly Second EOF



Third Principal Components of NOAA-9 OLR Anomaly

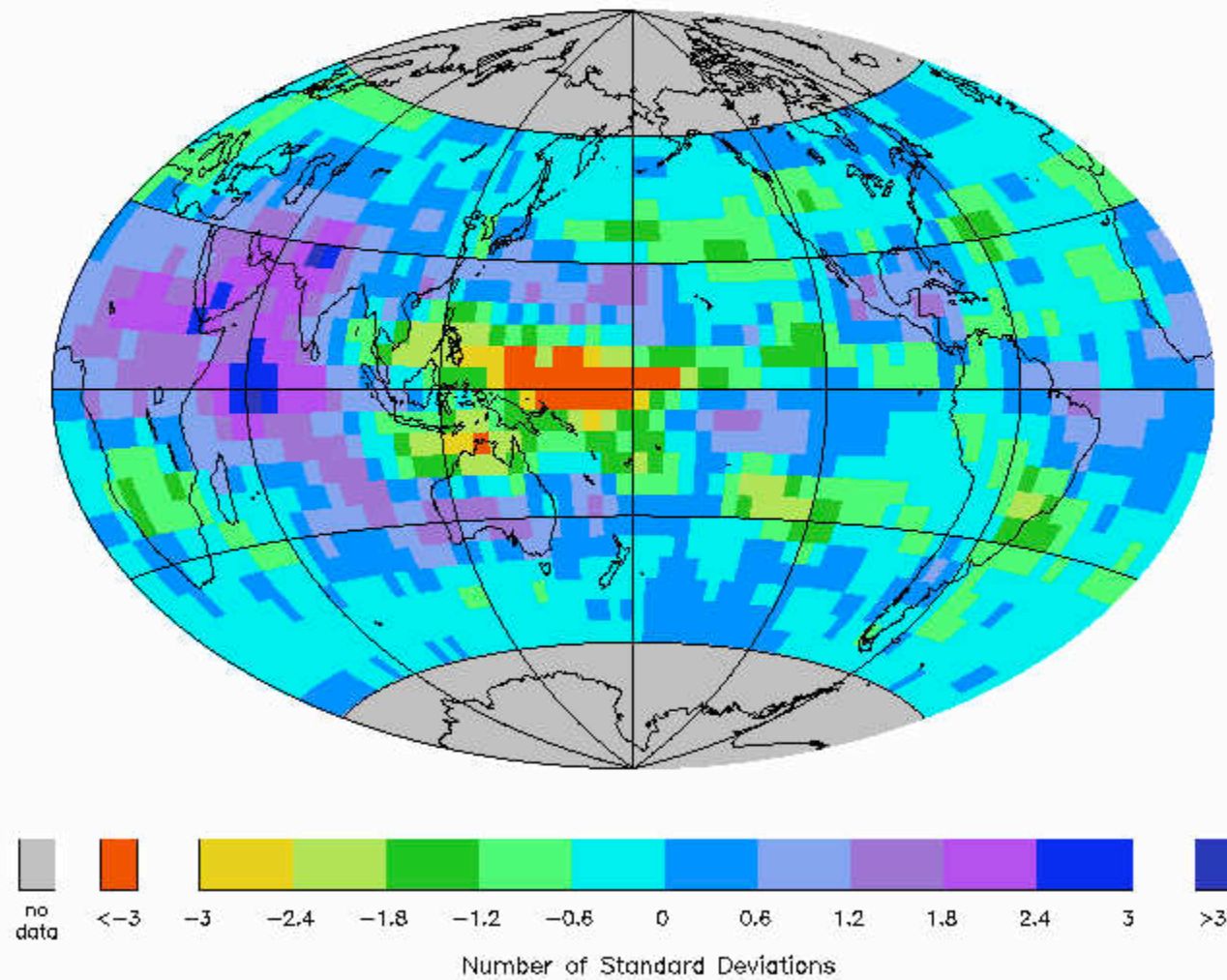
8502 - 9212 60N - 60S Latitude



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NOAA 9 LW Flux Anomaly Third EOF



Results from LW Study

- LW PC-1 shows ENSOs for 1986-7, 1989-90 and 1991-2.
- LW PC-2 is an artifact of precession.
- LW PC-3 is an artifact of precession.
- These artifacts can be removed.



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Mission Summary—NOAA-10

- NOAA-10 launched September 17, 1986
 - Scanner operated until May 21, 1989.
 - Nonscanner operated until November 1994.
 - Spacecraft pitchover and ERBE deep-space calibration performed January 12-13, 1995.
 - Due to near-terminator orbit, little emphasis given to NOAA-10 data because of other concerns.
 - Data are good for high latitudes: Noon near South Pole, Midnight near North Pole.



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Future Work

- Complete validation of NOAA 9 WFOV 1985-mid 1988 data set and put in Public Domain.
- Apply technique for removing precession artifacts from latter part of data set.
- Complete processing and validation of NOAA 10 WFOV data set and put in Public Domain.
- These are a damned-sight better Earth Radiation Budget data than Moonshine!



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